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Effect of herbal formulation (Churn) on type 2 diabetic patients

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Abstract

Diabetes Mellitus (DM) is a chronic metabolic disorder that prevents the body to utilize glucose completely or partially. DM is a fast-growing global problem with huge social, health and economic consequences. The control of blood glucose level is essential for effective management of diabetes. There are many synthetic drugs that are being used as standard treatment for diabetes but they have adverse effects and therefore, there is a need to search for alternative natural therapy against diabetes with lesser side effects. A large number of herbal plants are in vogue for the treatment of types 2 DM. The herbal plants which have antidiabetic properties namely Jamun seed (*Syzygium cumini*), Fenugreek seed (*Trigonella foenum*) and Turmeric (*Curcuma longa*) are used in the present study. Herbal formulation (Churn) was prepared from jamun seeds, fenugreek seeds and turmeric powder in the proportion of 50:45:5 per cent. It indicated that the supplementation of the herbal churn 20 g per day (10 g twice a day: in early morning and at bed time) continuously for two months was found effective for lowering and controlling of blood glucose as well as blood pressure level in type-2 diabetic subjects.

Keywords: Diabetes, Jamun seed, Fenugreek, Turmeric, Blood glucose, Herbal churn

1. Introduction

Diabetes is chronic metabolic disorder that prevents body to utilize glucose completely or partially. It is fourth leading cause of death by disease and every 10 second a person dies from diabetes related causes in the world (Aparna and Vijaya, 2009) [4]. If left untreated, diabetes can cause many complications include diabetic ketoacidosis and nonketotic hyperosmolar coma (Kitabchi *et al.*, 2009) [7]. A variety of alternative medicines have been traditionally used for the treatment of diabetes in India. A large number of herbal plants are in vogue for the treatment of types 2 DM. The herbal plants which have antidiabetic properties namely Jamun seed (*Syzygium cumini*), Fenugreek seed (*Trigonella foenum*) and Turmeric (*Curcuma longa*) are used in the present study.

Jamun seeds have very high quality for its curative function chiefly against diabetes because of its effect on pancreas. The ellagic acid and glucoside jamboline are known as bioactive components of jamun containing antioxidant activity and hold the capacity to convert the starch into sugar. Jamun seeds have hypoglycemic, anti-inflammatory, antipyretic, psychopharmacological, hypolipidaemic and antioxidant activities (Benherlal and Arumughan, 2007) [5]. The fenugreek plant used for decreasing blood sugar and lipid in diabetic and non-diabetic peoples and has antioxidant and antibacterial properties (Rajyalakshmi and Neeraja, 1996) [16]. Fenugreek seed powder used in the diet reduces blood sugar and urine sugar with concomitant improvement in glucose tolerance in type 2 diabetic patients (Analava and Debaprasad, 2004) [3]. Active compounds of fenugreek contain soluble fiber, alkaloids including trigonelline, diosgenin, saponins and 4-hydroxyisoleucine (Moorthy *et al.*, 2010) [13]. Turmeric (known as *haldi* in Hindi) has been used topically to heal and reduce bleeding associated with bruises, leech bites and inflamed joints. It also been used internally for liver and digestive complaints, menstrual insufficiency, jaundice and as an anti-inflammatory agent. In the Ayurveda it works well with all doshas; with its main action being to reduce mucus from the system (Prashanti and Jager, 2010) [14].

2. Materials and methods

2.1 Preparation of herbal formulation (Churn): The raw herbal ingredients of Jamun seeds, fenugreek seeds, and turmeric rhizome, fully matured and dried were procured from a retail outlet of Palanpur city. Each herbal ingredient was cleaned and ground by grinding machine to make fine powder. The herbal formulation was prepared by mixing this powder of jamun seed, fenugreek seed and turmeric in proportion 50:45:5 per cent, respectively as per its recommended dose reported in Ayurvedic literature.

2.2 Analysis of herbal churn: The herbal churn was analyzed for moisture, oil, ash, crude fiber, protein, iron, zinc, phenol and flavonoids contents. Moisture, oil and ash contents of the powder were determined by method described in AOAC (1984) [2]. Whereas crude fiber was determined by Raghuramula *et al.* (1983) [15], protein by Lowry *et al.* (1951) [10], iron and zinc by AACC (1995) [1], total phenol by Bray and Thorpe (1954) [6] and total flavonoid by Loaeza *et al.* (2011) [9] method. Antioxidant activity of the churn was measured by method of Williams *et al.* (1995) [18]. Each analysis was done in triplicate on two replicates.

2.3 Study design: A total 53 diabetic subjects including both men and women of age 40 to 80 years were selected by simple random sampling method for the study. Out of them forty three subjects were included in experimental group and ten were kept as control group. The churn was not given to the control group whereas 20 g churn per day (*i.e.* 10 g twice a day at early morning before breakfast and before sleeping hours in night) was given to the experimental group up to 60 days (18, November-2015 to 16, January-2016) to check the effects of the herbal formulation on blood glucose level.

2.4 Biochemical Assessment: The subjects were biochemically examined for blood glucose at regular interval of 0, 30 and 60 days to check the effect of herbal churn. Fasting and post prandial blood glucose were estimated by using a one touch pulse glucometer (model No. ISO15197 made by Johnson and Johnson company). Blood pressure of the subjects was measured by registered medical officer at University Primary Health Centre using Sphygmomanometer (Omron HEM-T112 BP Monitor).

2.5 Statistical analysis: The data were statistically analyzed by using SPSS 19 software (Rangaswami, 2010) [17]. Difference in the blood glucose level were compared by pair 't' test. This test was used for the comparison between two group's *viz.*, 0 and 30 days, 0 and 60 days and 30 and 60 days periods.

3. Results and Discussion

3.1 Nutritional composition of herbal formulation (churn):

The herbal churn was analyzed for moisture, oil, ash, crude fiber, protein, iron, zinc, total phenol, total flavonoids and antioxidant activity and data are presented in Table 1.

Table 1: Nutritional composition of herbal powder on dry weight basis (Mean of 3 readings)

Nutritional composition	Amount (on dry powder)
Moisture (%)	007.63
Oil (%)	002.46
Ash (%)	007.03
Crude fiber (%)	004.40
Protein (%)	015.39
Iron (mg/100 g)	007.46
zinc (mg/100 g)	002.01
Flavonoids (mg QE/100g)*	830.00
Phenol (mg CE/100g)#	390.00
Antioxidant activity (% free radical scavenging activity)	049.10

* QE = Quercetin equivalent, # CE = Catechol equivalent,

The data presented in Table 1 indicated that 100 g herbal formulation contains 7.63 g moisture, 2.46 g oil, 7.03 g ash, 4.40 g crude fiber, 15.39 g protein, 7.46 mg iron, 2.01 mg zinc, 830 mg flavonoids, 390 mg phenol and it has high antioxidant activity (49.10 per cent free radical scavenging activity). The data revealed that this churn is rich in protein, minerals, fiber, iron, phenol, flavonoids and antioxidant activity and its use can improve our health.

3.2 Biochemical assessment of diabetic subjects during the study

3.2.1 Effect of herbal churn on the blood glucose level of the type 2 diabetic subjects

Biochemical analysis of the subjects were done at 0 day (first test), 30 days (second test) and 60 days (third test) for the measurement of blood glucose level then it was compared by applying paired t-test with each other and data are presented in Table 2.

Table 2: Comparisons of blood glucose level of the subjects

Period (in day)	At fasting blood glucose (mg/dl)				At postprandial blood glucose (mg/dl)			
	BG [#] Mean ± S.Em	BGD [@] Mean	't' value	% (+/-)	BG [#] Mean ± S.Em	BGD [@] Mean	't' Value	% +/-
Control Group (n= 10 diabetic subjects)								
00	179.10±15.38				249.20±22.16			
30	186.90±14.90	07.80	2.17	+4.4	262.60±19.08	13.40	2.01	+5.4
00	179.10±15.38				249.20±22.16			
60	190.70±15.09	11.60	2.17	+6.5	246.50±14.29	02.70	0.19	-1.1
30	186.90±14.90				262.60±19.68			
60	190.70±15.09	03.80	0.89	+2.0	246.50±14.29	16.10	1.54	-6.1
Experimental group (n= 43 diabetic subjects)								
00	217.28±13.33				298.77±11.40			
30	173.28±08.69	44.00**	6.00	-20.2	209.95±08.45	088.82**	11.47	-29.7
00	217.28±13.33				298.77±11.40			
60	156.77±06.83	60.51**	6.34	-27.8	190.91±05.37	107.86**	11.94	-36.1
30	173.28±08.69				209.95±08.45			
60	156.77±06.83	16.51**	3.90	-09.5	190.91±05.37	19.04**	03.56	-09.1

BG[#] = Blood glucose, BGD[@] Blood glucose difference,

** = Significant at 0.01 probability level

% (+/-) = per cent increases (+) or decreases (-) over "0" days (Ist test)

The data given in Table 2 indicated that in type 2 diabetic subjects of control group; at 0, 30, 60 days period, fasting blood glucose levels were 179.1, 186.9 and 190.70 mg/dl, while postprandial blood glucose was 249.2, 262.6 and 246.50

mg/dl, respectively. It showed that during 60 days of study period, fasting blood glucose level slightly increased as time passed but postprandial blood glucose level increased up to 30 days and then decreased at 60 days but results were not

significant. The results indicated that blood glucose level remained higher in all the diabetic subjects of control groups during study period.

Herbal churn was given to type 2 diabetic subjects of experimental group for up to

60 days and fasting as well as postprandial blood glucose was measured. At 0, 30, 60 days period, fasting blood glucose levels were 217.28, 173.28 and 156.77 mg/dl, while postprandial blood glucose was 298.77, 209.95, and 190.91 mg/dl, respectively. Blood glucose level decreased continuously from 217.28 to 156.77 mg/dl (i.e. 27.8 % decreases) at fasting and 298.77 to 190.91 mg/dl (i.e. 36.1 % decreases) at postprandial during 60 days with herbal churn treatment. The effect was very fast up to 30 days (29.7 % decreases) as compared to 30 to 60 days (9.1% decrease) period. It showed that blood glucose level decreased continuously as the period of treatment extended in experimental subjects. It is a clear indicative that herbal formulation is very effective to control blood glucose level.

Relevant observations were reported by Mantra *et al.* (2005)^[12]. Kochhar and Nagi (2005)^[8] carried out clinical trials

involved 60 male subjects with type-2 diabetic for three months. At the end of the study, a significant reduction in fasting blood sugar and post-prandial glucose levels were achieved in both the groups.

3.2.2 Effect of herbal churn on the blood pressure of the type 2 diabetic subjects:

The effects of the herbal churn on blood pressure of the selected subjects were measured at zero, 30 and 60 days and mean data are presented in Table 3. The data showed that in experimental subjects systolic blood pressure was decreased from 145.16 to 131.00 mmHg and diastolic was decreased from 82.93 to 68.56 mmHg during 60 days with herbal churn treatment whereas, no variation was observed in control group. It indicated that this herbal formulation is very effective to control and regulate the blood pressure level of the type 2 diabetic subjects. Similar observation was reported by Mandlik *et al.* (2008)^[11] where they reported that poly herbal formulation can significantly deplete the level of blood glucose and also effect on blood pressure level of the type 2 DM patients.

Table 3: Comparisons of the blood pressure level of the subjects

Periods(days)	Systolic and Diastolic	Blood pressure (mmHg)	
		Control group (n=10) Mean ± S.D.	Experimental group (n=43) Mean ± S.D.
00 days	Systolic	136.30 ± 14.90	145.16 ± 20.72
	Diastolic	079.00 ± 11.60	082.93 ± 19.71
30 days	Systolic	135.70 ± 13.38	138.12 ± 18.79
	Diastolic	078.90 ± 11.74	075.91 ± 11.30
60 days	Systolic	135.60 ± 13.69	131.00 ± 12.33
	Diastolic	078.40 ± 11.96	068.56 ± 08.56

4. Summary and Conclusions

The present study indicates the biochemical efficacy of the herbal formulation (churn) in the treatment of diabetes. The herbal churn was prepared from mixing the powder of jamun seeds, fenugreek seeds and turmeric in the proportion of 50:45:5 per cent, respectively. The consumption of 20 g (10 g churn twice a day in morning before breakfast and 10 g at bed time in night) of herbal churn continuously for two months found effective for lowering and controlling of blood glucose as well as blood pressure level to the diabetic patients.

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